Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Wireless E911 Location Accuracy Requirements	)	PS Docket No. 07-114
	)	
	)	

COMMENTS OF VERIZON

Verizon supports the establishment of a technically feasible vertical location ("Z-axis") accuracy metric as an important next step in meeting the Commission's objective of improving the accuracy of indoor 9-1-1 caller location information available to public safety answering points ("PSAPs"). With a few important clarifications, the approach proposed in the *NPRM*[1] would provide solution providers, handset manufacturers, and service providers many of the parameters they need to develop, test and implement accurate and scalable Z-axis solutions.

I. INDOOR LOCATION ACCURACY WILL CONTINUE TO IMPROVE WITH NEW DEVICE-LEVEL CAPABILITIES.

Verizon and the other nationwide service providers have made great strides in improving the accuracy of E9-1-1 caller location information since the Commission first adopted its indoor location accuracy rules in 2015. We have established an independent testing regime to help verify and improve the accuracy of horizontal location information. We have worked to deploy solutions, such as device-based hybrid ("DBH") and mobile station-assisted technologies, that

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[1] *Wireless E911 Location Accuracy Requirements*, Fourth Further Notice of Proposed Rulemaking, PS Docket No. 07-114, FCC 19-20 (2019) ("*NPRM*").

have improved the accuracy of horizontal location.[2] Service providers have already created and tested the National Emergency Address Database (the "NEAD"), and found that with handset manufacturer support and participation by other providers of Wi-Fi access points, it could deliver a dispatchable location to capable PSAPs.[3]

Z-axis accuracy and scalability, though, will be even more dependent on handset-level capabilities than prior iterations of the Commission's E9-1-1 location requirements. Establishing a feasible Z-axis metric in this proceeding can provide solution providers, as well as chipset and handset manufacturers, the accuracy metrics and certainty needed to develop their products, and better enable them to determine when and how their solutions will scale across the markets covered by the Commission's rules. Those stakeholders' input will be particularly critical in this proceeding.

II. THE COMMISSION SHOULD ADOPT A 3-METER/80 PERCENT METRIC BASED ON TEST BED PERFORMANCE OF Z-AXIS CAPABLE DEVICES.

Verizon supports the Commission's proposed 3-meter Z-axis metric. It is more aggressive than what vendors were able to demonstrate in the Test Bed,[4] but is a good target for 9-1-1 calls from devices with the necessary capability. Strict floor level accuracy might be a valid longer term goal, but the *NPRM* correctly finds that the Test Bed results did not support either it or a more stringent two-meter standard.[5] In addition, floor level accuracy may depend at least in part on participation by not only service providers and vendors but third party building

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2 *See* Verizon Status Report, PS Docket No. 07-114, filed Aug. 2, 2018.

3 *See* CTIA Ex Parte Letter, PS Docket No. 07-114, filed Apr. 26, 2019.

4 *See* CTIA Ex Parte Letter, PS Docket No. 07-114, filed Aug. 3, 2018.

5 *See NPRM* ¶ 19.

owners and tenants—which would have technical feasibility and jurisdictional implications beyond the scope of the rules contemplated in this proceeding based on test bed performance to date.[6]

The proposed rule appropriately would apply the 80 percent performance standard to a solution's test bed performance.[7] Consistent with the Commission's approach to horizontal location accuracy, applying the percentage figures achieved in the test bed can help ensure that solutions perform as vendors contend, and that they are technically feasible. Reliance on the test bed performance of capable devices also enables service providers to phase in capable handsets in a manner consistent with the Commission's longstanding approach to handset-based solutions generally.[8]

And in the test bed, whether a particular device model meets the appropriate percentage-based standard must be determined using handsets with the necessary chipset, hardware and software capability (barometric pressure sensor or otherwise). Devices that support device-based hybrid solutions for horizontal location will not necessarily have all the capabilities needed to support the delivery and processing of vertical location information.[9] For example, the barometric pressure sensor on most new smartphones is not enough to deliver and process such information. The device also must be able to, in sequence: receive assistance data from the Z-axis solution's or service provider's network; compensate for sensor bias and compute Z-axis

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6 *See id.* ¶¶ 15-19 (technical feasibility of 3-meter Z-axis metric based primarily on solutions participating in the test bed).

7 *See id.* ¶ 11, and 47 C.F.R. § 20.18(i)(2)(iii) (compliance would be based on test bed performance and deployment of solution consistent with test bed).

8 *See* 47 C.F.R. §§ 20.18(h)(2), (i).

9 *See NPRM* ¶ 18.

location; and convey that data through support of the LPP/LPPe interface to the service provider. The feasibility and scalability of Metropolitan Beacon System (MBS) solutions are likewise dependent in part on chipset- and handset-level capabilities to enable the chipset to send the information through the modem layer. For our part, Verizon's device specifications already request the LPP/LPPe interface and NEAD support, but virtually no handset manufacturers have implemented or activated these basic capabilities.

For these reasons, Z-axis solutions will remain at least partially dependent on the evolution of device-level location capabilities for the foreseeable future. The *NPRM* helpfully urges further testing and demonstrations of Z-axis solutions, and the Commission should continue to engage not just service providers and public safety stakeholders in this effort, but also solution providers, chipset vendors and handset vendors.

III. DEPLOYING THE NETWORK-LEVEL COMPONENTS OF Z-AXIS SOLUTIONS SHOULD FOCUS ON URBAN AND DENSE URBAN AREAS WHERE MULTI-STORY BUILDINGS ARE CONCENTRATED.

Reliable Z-axis solutions also will require corresponding network-level capabilities to help calibrate and process information generated by a device's barometric pressure sensor. The network-level dependencies of MBS solutions that rely on their own antenna facilities, independent of service providers, are well-documented.[10] Other Z-axis solutions also would require similar capabilities, including installation or activation of barometric pressure sensors, for example, at cell sites. In addition, depending on the solution, a service provider's Location

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[10] *See, e.g.*, Communications Security, Reliability and Interoperability Council III, *Leveraging LBS and Emerging Location Technologies for Indoor Wireless E9-1-1*, Report, §§ 4.3.4, 5.3.1 (Mar. 14, 2013); NextNav Reply Comments, PS Docket No. 07-114, at 7 (July 14, 2014) ("[w]ith MBS technology, accuracy levels are largely a function of optimizing beacon placement and density").

Server may need to be capable of receiving the barometric pressure support information from the network of sensors and pass it to the device. (Alternatively, sensor data may need to be available to Z-axis solution providers, who then would share that information with the device to compute the Z-axis estimate—in which case the solution provider's network would need be able to receive the barometric pressure information from that network of sensors.) Some standards work is already complete (the LPP/LPPe interface), and other work is under way to address how service providers will format and deliver Z-axis information to PSAPs. But implementation of commercially available solutions will not occur in advance of the current 2021 and 2023 deadlines.

Finally, given how Z-axis solutions have evolved since the rules were initially adopted in 2015, and based on what we now know about the distribution of 9-1-1 calls across different morphologies, the Commission should refine the per-CMA requirement to enable service providers to target deployment of network-level capabilities in urban and dense urban areas. It is in these areas where multi-story buildings are concentrated, so service providers should focus their deployments on urban and dense urban areas within the covered CMAs. The Commission's public safety objectives would not be served if deployment of the capability in a suburban area helps achieve the 80 percent coverage benchmark, but the result is that Z-axis coverage is provided for single-story residential dwellings, rather than the multi-story buildings where those residents work (but do not live).

CONCLUSION

For the foregoing reasons, the Commission should adopt a technically feasible and scalable Z-axis location accuracy metric that will enable all necessary stakeholders to move forward with viable vertical location solutions.

Respectfully submitted,

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